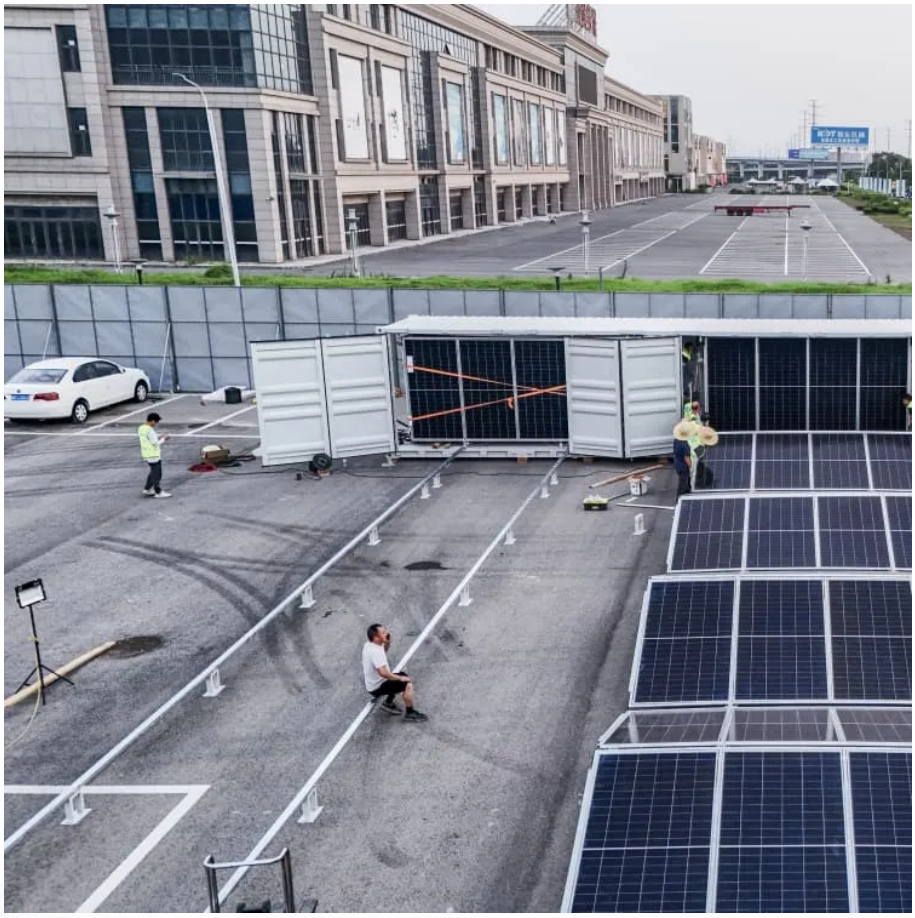
EIEI POWER

Dual-stage solar grid-connected inverter



Overview

This study introduces a new topology for a single-phase photovoltaic (PV) grid connection. This suggested topology comprises two cascaded stages linked by a high-frequency transformer. In the first stage, a new buck–boost inverte. This study introduces a new topology for a single-phase photovoltaic (PV) grid connection. This suggested topology comprises two cascaded stages linked by a high-frequency transformer. In the first stage, a new buck–boost inverter with one energy storage is implemented. The buck–boost inverter can convert the PV module’s output voltage to a high-frequency square wave (HFSWV) and can enhance maximum power point tracking (MPPT) even under large PV voltage variations. The high-frequency transformer gives galvanic isolation for the system, which decreases the leakage current and improves the system power quality. The second stage of the topology involves using a rectifier-inverter system to interface the produced HFSWV to the utility grid. The proposed system uses high switching fre.

••The high-frequency transformer gives galvanic isolation for the system, which decreases the leakage current and improves the system power quality.••The second stage of the topology involves using a rectifier-inverter system to interface the produced HFSWV to the utility grid.••Buck–boost DC/AC inversion, MPPT and low grid current injection can be implemented effectively.

Buck–boost inverterPVHigh frequency transformerMPPT.

DCM□Discontinued conduction modeGPV□Grid connected PV systemHFSWV High-frequency square waveMPPT□Maximum power point trackingHFT□High-frequency transformerLFT□.

Electrical power plants based on renewable energy sources are growing rapidly around the world to fulfill the electrical power demand due to economic and environmental concerns (Mosalam et al., 2018). Solar PV power plants is considered a very important source of electricity. Its low cost and simplicity of implementation make it a preferred choice for electricity production, especially for individuals or rooftop installations. Over the last three decades, researchers have tried various techniques to increase the energy produced from PV power plant. The PV generation efficiency is low (i.e., 25% maximum conversion efficiency) (Wang et al., 2021, Hsu et al., 2017). Several issues and challenges arise when installing PV systems due to nonlinear characteristic of output power. These challenges include c.

What is a two-stage grid-connected inverter for photovoltaic (PV) systems?

In this study, a two-stage grid-connected inverter is proposed for photovoltaic (PV) systems. The proposed system consist of a single-ended primary-inductor converter (SEPIC) converter which tracks the maximum power point of the PV system and a three-phase voltage source inverter (VSI) with LCL filter to export the PV supplied energy to the grid.

What is a dual-stage inverter for grid-connected applications?

Table 1. The dual-stage inverter for grid-connected applications includes a DC-DC converter to amplify the voltage and a DC-AC inverter to control the current injected into the grid. Figure 3. The DC-DC converter is depicted in Figure 3 together with the DC-AC converter and LCL filter.

What are the advantages of a two-stage PV Grid-connected system?

The two-stage PV grid-connected structure has the advantages of high flexibility and scalability, and is suitable for large-scale PV power generation systems. Its dynamic regulation capability can reduce system costs, improve system efficiency, and maintain the PV power generation system in the best performance state.

What is the topology for a single-phase photovoltaic (PV) Grid connection?

This study introduces a new topology for a single-phase photovoltaic (PV) grid connection. This suggested topology comprises two cascaded stages linked by a high-frequency transformer. In the first stage, a new buck–boost inverter with one energy storage is implemented.

Dual-stage solar grid-connected inverter

[STEVAL-ISV002V1, STEVAL-ISV002V2 3 kW grid ...]

The dual-stage inverter for grid-connected applications includes a DC-DC converter to amplify the voltage and a DC-AC inverter to control the current injected into the grid.

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[Two-stage grid-connected inverter for PV systems]

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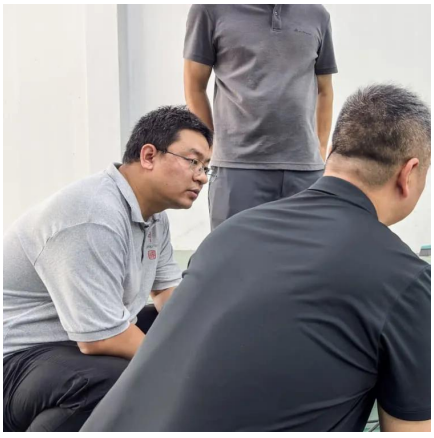

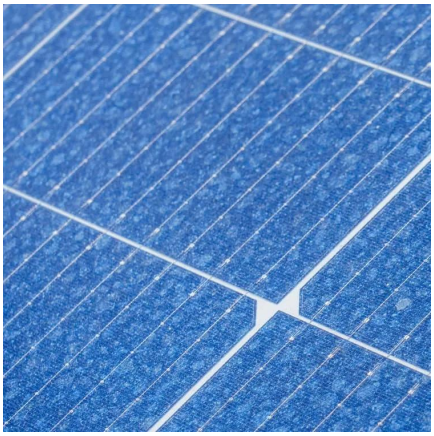

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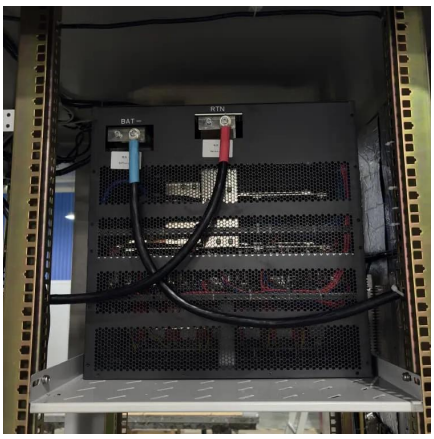

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